DISCUSSION OF THE AMENDMENT

Claims 1 and 30 have each been amended by deleting "does not significantly affect any application properties of the diamond material," by changing "readily" to --visually--, and by limiting the diamond material to a gemstone, as supported by, for example, Claim 31. Claims 31 and 41-43 have been canceled. Claims 32-35 have been amended by deleting now superfluous matter.

No new matter is believed to have been added by the above amendment. Claims 1, 3-30, 32-40, 44-53 and 75-79 are now active in the application; Claims 54-74 stand withdrawn from consideration.

REMARKS

Due to the length of the specification herein, Applicants will cite to the paragraph number of the published patent application (PG Pub) of the present application, i.e., US 2007/0148374, when discussing the application description, rather than to page and line of the specification as filed.

The rejections of Claims 1, 3-7, 11, 21-26, 29-35, 40-49, 51-52 and 75-79 under 35 U.S.C. § 102(e) as anticipated by or, in the alternative under 35 U.S.C. § 103(a) as unpatentable over, WO 03/014427 (Linares et al), and of the remaining active claims under 35 U.S.C. § 103(a) as unpatentable over Linares et al in view of other applied prior art, are respectfully traversed.

Applicants incorporate by reference all the arguments made in the previous amendment in traversal of the above-applied prior art. Note that the active claims are now limited to a gemstone as the CVD single crystal diamond material.

Linares et al discloses incorporating one or more doped layers into a synthetic single crystal CVD diamond material in order to provide improved properties. It is notable that the feature of providing improved properties, described at page 11, lines 17-20, is also recited in Claim 1 therein as being an essential feature of their claimed invention. Linares et al envisaged a number of different types of dopant which may be used and a range of application areas in which the doping techniques could be applied. Dopants mentioned by Linares et al include chemical dopants (boron and nitrogen) and it is taught that providing one or more doped layers can improve properties such as hardness and fracture toughness for mechanical applications, electrical conductivity for electrical applications, and optical properties for lenses, windows and gemstone. Clearly for gemstone applications it is the visually perceptible optical properties of the material which are of importance. Accordingly, in the field of gemstones it is clear that by specifying that the doping is to provide improved

properties, Linares et al are teaching to provide one or more chemically doped layers which result in a perceptible improvement in the optical properties, such as color or clarity, of the material. For example, Linares et al discloses that whole diamonds or individual layers can be made to have a blue coloration which ranges from sky blue to very dark blue by adding boron (page 22, lines 19-24). Clearly, this type of doping is visually detectable under normal viewing conditions and in fact is intended to be so, i.e., it is explicitly taught that the doping is to provide a blue coloration.

As previously pointed out, Linares et al discloses only chemical doping which would be readily detectable under normal viewing conditions (as opposed to isotopic doping). Under Response to Arguments, the Examiner finds that Linares et al discloses a wide range of dopant concentrations, for instance boron in the range 0.03 [sic, 0.05] to 3000 ppm, while Applicants "claim" generally 0.0001 to 10 ppm. The Examiner finds that as 0.03 [sic, 0.05] lies within the range of values disclosed in the specification herein, then a *prima facie* case of obviousness exists.

In reply, this finding is incorrect for the following reasons.

The 0.0001 to 10 ppm disclosed range herein is in relation to **silicon** dopant, as described at paragraph [0082]. For **boron** dopant, the disclosed range is preferably a maximum of 1 ppm, more preferably 0.3 ppm, 0.1 ppm, 0.05 ppm, or most preferably 0.02 ppm, as described at paragraph [0080]. Still, the 0.05 ppm lower bound for boron concentration disclosed in Linares et al is below the 1 ppm upper bound of the broadest range for boron concentration described herein. However, this is not sufficient to produce a *prima facie* case of obviousness. Whether a perceptible blue coloration is provided by a boron doped layer will depend both on the concentration of boron in the layer and the **thickness** of the layer. For a thick layer of boron doped material, the concentration level at which a perceptible blue color is provided is lower than for a thin layer. Linares et al discloses that

whole diamonds or **individual layers** can be made to have a blue coloration which ranges from sky blue to very dark blue by adding boron to yield a boron concentration ranging from about 0.05 ppm to about 3000 ppm in the diamond (page 22, lines 19-24). It is also suggested that the coloration will change with thickness. As such, it is clear that a blue coloration is intended and that the lower concentrations in the range are appropriate for thick layers or indeed whole diamonds as suggested in this portion of Linares et al. As such, to the extent that the very broad ranges disclosed in Linares et al overlap at their lower end with the upper portion of ranges described in the specification herein, there is still no disclosure of the present invention because the detectable coloration will depend on both concentration and layer thickness.

While the Examiner has requested testing data of Linares et al, such is not necessary, because Applicants are not contradicting the fact that boron doping therein results in the formation of a blue coloration. On the contrary, the Examiner is contradicting both Linares et al and Applicants by suggesting that Linares et al does not result in any perceptible color change. Indeed, the whole purpose of Linares et al is clearly and explicitly disclosed as being able to achieve a perceptible change in material properties by doping. In terms of gemstones, this must be a perceptible change in optical characteristics such as color and/or clarity. As such, Linares et al clearly teach completely away from what is now claimed herein.

This difference is made clearer by the fact that the present claims have now been amended so as to be limited to gemstones and treatment thereof. As Linares et al require as an essential feature that their doping must provide improved properties, in the gemstone field this would appear to be a perceptible change in the visual characteristics of a gemstone under normal viewing conditions. As such, a skilled person following the teachings of Linares et al and seeking to provide an improved gemstone would dope one or more layers of synthetic diamond or a whole diamond during CVD growth to a suitable **concentration and thickness**

combination in order to achieve a visually perceptible change in the color or clarity of the gemstone and that the whole purpose of such doping is to provide such a change in coloration, at least for gemstone application. This is completely contrary to the presently-claimed invention which requires the chemical dopant to form a mark or fingerprint which is not visually detectable under normal viewing conditions but which is detectable when excited, for example, to fluoresce or phosphoresce depending on the type of dopant utilized. Linares et al also discloses doping to change other characteristics of diamond material, for example for mechanical, thermal, or electronic applications, which may or may not involve a visually perceptible change. Such chemical doping, it is submitted, would result in a visual change in the material's appearance. For example, boron doping levels required to achieve conductive diamond material result in the material being blue and even opaque and black in appearance. However, these materials and applications are not applicable to gemstones for which the important characteristics are optical and Linares et al discloses the use of chemical doping to change the visual appearance in such applications, e.g. boron doping to provide blue colored diamonds.

The Examiner further suggests under Response to Arguments that if the dopant concentration is indeed what Applicants feel is what is novel and non-obvious, then Applicants should amend the independent claims to include concentration limitations.

In reply, as will be evident from the previous discussion, the concentrations required to ensure that the chemically doped marks are not visually detectable under normal viewing conditions but are detectable under excitation illumination will depend on dopant type and layer thickness. Furthermore, in a gemstone the visual detectability of such a mark will depend on the position of the mark and the cut of the gemstone as described in the specification herein. See, for example, point (b), point (d), point (e) at paragraphs [0052]-[0055]. As such, limitation to specific concentration ranges would be inappropriate.

Furthermore, such limitations are not required as the claims already clearly distinguish over the prior art by specifying that the chemically doped mark is not visually detectable under normal viewing conditions but is detectable under excitation illumination.

Finally, the Examiner finds under Response to Arguments that "applicants are not claiming marking inside of the diamond or on the surface".

In reply, Applicants **are** claiming marking inside diamond material. However, while chemical doping and marking of diamond material is known, e.g., by laser or by isotopic ^{13}C marking, what is not known is marking of diamond material using chemical doping such that the marking is not visible under normal viewing conditions but is visible when optically excited, for example via fluorescence or phosphorescence. Such marking is based on the finding that it is possible to incorporate a doping mark such as a layer having a concentration, thickness and position within a gemstone such that the mark is not visible under normal viewing conditions but is visible under excitation. This has not previously been disclosed or suggested prior to filing the present application and has advantages over both laser marking (which can be more readily removed) and isotopic marking (which is expensive and difficult to detect). If such marking by chemical doping was obvious as suggested by the Examiner, and it clearly has advantages over prior art marking techniques, then the question has to be asked as to why hadn't someone already disclosed such a marking technique? This is a clear indicator that the presently claimed invention would not have been obvious and any allegation to the contrary clearly constitutes a hindsight analysis of the prior art.

None of the remaining applied prior art remedy the defects in Linares et al, because none disclose or suggest using chemical dopants for marking CVD diamond according to the protocol, for reasons already advanced, of record.

For all the above reasons, it is respectfully requested that the rejections be withdrawn.

The rejection of Claims 1, 3-53 and 75-79 under 35 U.S.C. § 112, second paragraph, as indefinite, in the recital of the term "does not significantly affect any application properties of the diamond material," is respectfully traversed.

The Examiner finds that the term "significantly affect" implies that some level of effect is allowed, however to what degree cannot be construed given the specification at hand and the instant claim set. The Examiner further finds that the application properties are undefined and has requested that Applicants amend Claim 1 to specify what the properties are and to what degree they can be affected under the claims.

In reply, synthetic single crystal CVD diamond material can be used for a range of applications including electrical, optical, thermal management, and mechanical applications. As such, there are a large number of possible application properties which can be defined depending on the application and the significance of any change in property will also be dependent on the application. It is respectfully submitted that one skilled in the art would clearly understand the metes and bounds of the term "significantly affect" depending on the particular diamond application.

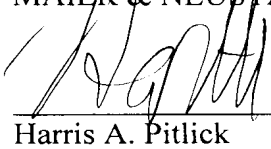
Moreover, for the application area of synthetic gemstones, the property is clearly defined in the specification herein as being the optical appearance, such as the color, of the gemstone under normal viewing conditions, and the degree to which the mark of origin or fingerprint can affect the optical appearance or color is such that the optical appearance or color should not visibly change under normal viewing conditions. In practice, the optical appearance and quality of a gemstone would be determined by a skilled gem grader who would assign specific grades based on the "4 C's" of color, clarity, cut and carat weight. In this context, the mark of origin or fingerprint must be such that it does not affect the grading of a comparable gemstone which has a uniform composition without the mark of origin or fingerprint present.

Nevertheless, the rejection is now moot in view of the above-discussed amendment. Accordingly, it is respectfully requested that this rejection be withdrawn.

All of the presently-active claims in this application are now believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.



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